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change in the present edition is the use of the Engler and Prantl sequence as presented in Britton's *Manual*.—J. M. C.

THE SECOND FASCICLE of LÉVEILLÉ'S[8] monograph of Oenothera has appeared, the first fascicle having been noticed in this journal for April 1903 (p. 296). Naturally it is of great interest to American taxonomists, and contains a profusion of illustrations. The genera Eulobus and Gayophytum have been merged under Oenothera, and *O. bistorta* Nutt. has been replaced in great part by *O. chieranthifolia* Hornem.—J. M. C.

THE FOREST WEALTH OF OREGON is the title of a small pamphlet prepared by E. P. SHELDON[9] setting forth the forest resources of the state, with a list of forest trees and larger shrubs. Of these thirty-eight are gymnosperms.—C. R. B.

IN CONTINUING his revision of Eucalyptus, MAIDEN[10] presents *E. stellulata*, *E. coriacea*, and *E. coccifera*, under each species giving the description, synonyms, range, and affinity.—J. M. C.

THE EIGHTH VOLUME of the fourth series of HOOKER'S *Icones Plantarum* closes with the publication of the fourth part January 1905. The plates of this part are 2776–2800.—J. M. C.

NOTES FOR STUDENTS.

HESSELMAN[11] has published a paper on Swedish meadows, which should be carefully read by all who are engaged in ecological research, since no recent paper has gone more fundamentally or successfully into the real problems of ecology. The studies have been carried on for nearly a decade, and in a rather limited area in the neighborhood of Stockholm, and with especial detail on the little island of Skabbholmen. The "Laubwiesen" are meadows in which there are scattered deciduous trees, the general aspect being park-like. They might perhaps be regarded as edaphic savannas. These formations are rich in herbs and grasses, and are essentially without low shrubs. At an earlier time the "Laubwiesen" covered extensive areas, but they are now restricted to what may be called new terranes, especially near the coast and about inland lakes. They seem to be particularly favored by maritime climates and calcareous soils. Floristically the vegetation is closely related to that of oak or beech woods on calcareous soil rich in humus. The dominant trees are ash, oak, linden, elm, and beech,

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[8] LÉVEILLÉ, H., Monographie du genre Oenothera. Le Mans. 1905. 100 fr.

[9] SHELDON, E. P., The forest wealth of Oregon. 12mo. pp. 32. *pls.* 4. Portland, Ore. Printed by direction of the Lewis and Clark Exposition Commission. 1904.

[10] MAIDEN, J. H., A critical revision of the genus Eucalyptus. Part V. *pls.* 4. Published by the authority of the Government of the State of New South Wales. 1904. 2s. 6d.

[11] HESSELMAN, H., Zur Kenntnis des Pflanzenlebens schwedischer Laubwiesen. Eine physiologisch-biologische und pflanzengeographische Studie. Beih. Bot. Cent. **17**:311–460. *pls.* 4–8. 1904.

while the hazel is the chief shrub. The herbage is so dense as to exclude most mosses. The formation is often developed from salt marshes and HESSELMAN gives an interesting account of the developmental stages. The alder is commonly the pioneer ligneous form, and is followed by the ash. The author's most important contribution is experimental, and in this field he has clearly pushed forward the frontiers of our knowledge. His results deal chiefly with the ecology of starch formation, respiration, and transpiration. An important feature of his results is that they are rigidly quantitative. In the study of starch formation, close correlation was made with the light intensity, in which WIESNER'S methods were employed. The "Lichtgenuss" varied from about 1 in open meadows to $\frac{1}{65}$ in dense hazel thickets. Much formation of starch was observed under the trees in early spring, and all through the summer as well in open meadows. The very same species that were found rich in starch in the woods in spring were found nearly without it in the summer shade. In the ash woods, however, starch is formed in summer by all herbs, except a few which are always poor in starch. This is correlated with the greater light intensity of ash woods, as compared with other kinds. Anatomical studies are also correlated with the above, and it is found that those plants which develop their leaves late in the forest shade have a weak development of palisade cells, while the plants which develop their leaves in the intenser light of early spring have more palisades. Trees with high light requirement were found to have but one leaf type, namely a sun leaf; while shade-enduring trees have both sun or shade leaves, depending on their growth conditions. Trees of the first class, such as the ash or birch, show starch formation in all leaves, wherever placed. Plants of the second type, such as oak or hazel, do not form starch in the innermost leaves. In equal light shade leaves form more starch than do sun leaves of the same species. Starch formation decreases from spring to summer in the woods more in sun plants than in shade plants. Shade plants respire much less than do sun plants. Shade plants transpire much less in the shade than do sun plants in the sun, especially on hot or dry days. The leaf surface being equal, plants transpire more as they have a greater development of palisade cells, though many have thought that palisade cells in some way check transpiration, since they commonly occur where such protection seems necessary.

The great detail with which HESSELMAN'S studies have been pursued, and the tedious quantitative experiments, may well furnish a model for many workers in all lands. The paper is illustrated by several reproductions of photographs, and a number of text figures showing anatomical details.—H. C. COWLES.

THE ACHROMATIC figure in *Pellia epiphylla* has been investigated again, this time by GREGOIRE and BERGHS,[12] who have devoted their attention to the intrasporal mitoses of the germinating spore, and in some degree to the first mitosis in the spore mother-cell. The figures show some improvement over those of their predecessors and indicate a technique of the highest order. The researches of

[12] GREGOIRE, V., and BERGHS, J., La figure achromatique dans le *Pellia epiphylla*. La Cellule **21**: 193–233. *pls. 1–2.* 1904.

DAVIS and of the reviewer are frequently discussed through the work. In the opinion of the reviewer, our technique was also good and enabled us to see the structures described in the present paper, so that differences in conclusions are due in large measure to differences in interpretation of structures which other investigators have seen. The present writers support the reviewer's conclusions that the two poles of the chromatic figure arise in succession and independently, and also that the nuclear membrane belongs to the category of the *Hautschicht*. Without details, some of the principal conclusions are the following: In the segmentation of the spore (beginning with the third mitosis) the asters are continuous from pole to pole and the achromatic figure surrounds both the nucleus and the "polar vesicles" ("caps"). The achromatic figure results simply from a rearrangement of the general cytoplasmic reticulum. Neither the nucleus nor the vesicles (caps) contribute to the formation of the spindle. The vesicles are nothing but nuclear sap diffused into the cytoplasm. After mitosis the achromatic structures are transformed into the general cytoplasm of the cell. At no stage is there a genuine centrosphere or centrosome. The first mitoses in the germinating spore and the mitoses in the spore mother-cell show neither asters nor polar vesicles (caps), but in other respects the evolution of the achromatic figure is the same as in other mitoses. The authors hold that there is no distinction between kinoplasm and trophoplasm. No importance is attached to the structure described by others as a centrosphere. These researches on Pellia contradict many theories in regard to the mechanism of mitosis.—C. J. CHAMBERLAIN.

PHILLIPS[13] has contributed some startling discoveries to an already confused subject. Particularly interesting are his conclusions as to the structure of the central body of the Cyanophyceae, which he regards as a nucleus, and the occurrence of sexual fusions in the formation of the spores. In unsectioned filaments, since "sections revealed very little that could not be seen equally as well in the uncut object," the author has discovered that the chromatin of the central body is aggregated in hollow vesicles in the resting cell. This vesicular appearance disappears in the dividing cell and the chromatin granules become arranged in a loose network. In this condition, he finds the minute granules themselves multiplying by transverse division. Nuclear division follows, which may be by one of two modes, both occurring even in the same species. One, according to the author, evidently corresponds to a direct division, while the other is a primitive mode of karyokinesis. The latter resembles closely the method of mitosis described by KOHL,[14] in which a double transverse division occurs in the spirem thread, never a longitudinal splitting. The author has also discovered thick-walled spores in Oscillatoria, which are produced after the fusion of several cells

[13] PHILLIPS, O. P., A comparative study of the cytology and movements of Cyanophyceae. Contrib. Bot. Lab. Univ. Pennsylvania **2**:237–335. *pls. 23–25*. 1904.

[14] KOHL, F. G., Ueber die Organisation und Physiologie der Cyanophyceenzelle und die mitotische Theilung ihres Kernes.

(one to four) into one, and after certain adjoining cells, called by him "nurse cells," have gradually disintegrated and given up their chromatin to the forming spore. The first fusion is regarded as probably a sexual act, but he does not appear to attach this importance to the giving up of the chromatin by the "nurse cell." His figures of the spores of Oscillatoria remind one of small hormogonia, while his "nurse cells" evidently correspond to the cells adjacent to the hormogonia which have been heretofore regarded as collapsed, dead cells.

The author makes a third distinct contribution, which is also far from convincing, in that he finds that the movements of the Cyanophyceae are caused by delicate cilia, distributed along the sides of the filament.—EDGAR W. OLIVE.

THE OVULE of seven genera of cycads, Zamia, Macrozamia, Ceratozamia, Encephalartos, Bowenia, and Dioon, have been investigated by Miss STOPES.[15] The work was done in GOEBEL'S laboratory and the standpoint is that of phylogenetic anatomy.

The integument in all the forms studied is differentiated into three layers, the outer and inner being fleshy, while the middle is the well-known stony layer. The inner system of bundles does not lie in the nucellus (which in all living cycads and their fossil relatives is absolutely without vascular bundles), or between the nucellus and integument, as is commonly supposed, but belongs to the inner fleshy layer of the integument. These bundles, which in all the seeds examined are similar and simple, sometimes extend beyond the nucellus, reaching almost to the micropyle. The larger ones are collateral and the phloem is not strongly developed. It is often hard to determine where the protoxylem lies, but, in general, the bundles are endarch. In the simplest case, these bundles come from the branching of a single concentric or nearly concentric bundle.

The bundles in the outer flesh, with few exceptions, are collateral, with outer phloem and inner mesarch xylem. The central strand, from which these bundles come, is usually concentric.

It is certain that the fossil seed, Lagenostoma, is related to living cycads. Evidence indicating this relationship is presented in detail and is illustrated by diagrams. Miss STOPES believes that Lagenostoma lies near the common origin of the two groups. The single integument of the cycads is thought to correspond to the two separate integuments of Lagenostoma.

It is particularly interesting to note that Cycas itself, generally thought to be the most primitive of the cycads, has the most highly developed seed to be found in the group.—C. J. CHAMBERLAIN.

ZACHARIAS[16] adds another article to his long series of writings on the structure of the cyanophyceous cell, which leaves the subject in deeper uncertainty than ever. This latest addition is in the main a sharp criticism of the methods and

[15] STOPES, MARIE C., Beiträge zur Kenntniss der Fortpflanzungsorgane der Cycadeen. Flora **93**:435–482. *figs. 37.* 1904.

[16] ZACHARIAS, E., Ueber die Cyanophyceen. Jahrb. Hamburg Wiss. Anat. **21**:49–89. *pl. 1.* 1903.

conclusions of KOHL and a reiteration of the principal results of his paper of 1890. He thinks that KOHL's "chromatin granules" were probably his small "Zentralkörner," or slime globules. While ZACHARIAS denies that it has been proved that the central body contains any granules other than the "Zentralkörner," yet he leaves the question still open as to the possibility of the existence of chromatin in this enigmatical body. He asserts strongly his belief, however, after an examination of the preparations of both KOHL and HEGLER, that there are no structures present which can be called chromosomes, as maintained by KOHL and BÜTSCHLI.

ZACHARIAS adds in the present paper some new observations on the nature of the cyanophycin granules. After repeating his earlier experiments on the effects of dilute HCl, he comes to a conclusion somewhat at variance with his earlier results, namely, that the granules in certain cases are not actually dissolved by the acid, but that nevertheless they undergo some change. He concludes, further, that there is no difference in the behavior of the cyanophycin toward dilute HCl and toward pepsin, thus disputing the results of HEGLER and KOHL. The author as well cannot agree with these investigators in their conclusions as to the albuminous and crystalloidal nature of the cyanophycin granules, although he adds nothing in support of his earlier supposition of their carbohydrate nature.

In regard to the duration of cyanophycin in filaments grown for a long time in the dark, ZACHARIAS differs from HEGLER and KOHL in asserting that there is no complete disappearance of cyanophycin and slime.—EDGAR W. OLIVE.

KOERNICKE reviews critically the present condition of researches upon the plant cell,[17] confining his attention to the morphological aspect now commonly spoken of as cytology. A little more than one half the work is devoted to the cytoplasm, the rest dealing with the nucleus.

That modern preparations do not show a series of artifacts but give a reliable view of structures, is proved by observations upon living material. The cytoplasm is regarded as consisting of two distinct substances, the kinoplasm and the trophoplasm. Spindle formation is described in all groups and the various views are clearly presented. The centrosome problem is discussed at some length. An impartial summary of the literature dealing with the blepharoplast is given, but the author expresses no opinion as to its homology. The nuclear membrane, cell plate, and *Hautschicht* are regarded as kinoplasmic structures. The paragraphs on protoplasmic continuity are especially valuable because the important investigations are so recent. Less attention is paid to the cell wall.

In treating the nucleus, the author deals principally with the works which have appeared since 1896, the date of Zimmerman's book on the nucleus, since when many investigators have studied the nuclei of the lower plants, especially the schizophytes and yeasts. Of course, the discussion of the chromatin occupies most of the space devoted to the nucleus. It is rather surprising that the Chara-

[17] KOERNICKE, M., Der heutige Stand der pflanzlichen Zellforschung. Ber. Deutsch. Bot. Gesells. **21**: Generalsammlungs-Heft 66–134. 1904.

ceae, Liliaceae, and Amaryllidaceae should be credited with the largest nuclei, for their nuclei are small when compared with those of the eggs of some gymnosperms.

No figures are given, but the references are very numerous and authority is cited for every statement.—C. J. CHAMBERLAIN.

AFTER REVIEWING several of the more important publications regarding the statolith theory, TISCHLER[18] states that adequate evidence to establish a correlation between movable starch grains and the perception of the gravitation stimulus is not available; and it is his opinion that such evidence cannot, with present methods, become available, for the simple reason that while the reaction may be optically observed the perception is hidden and a constancy of quantitative relation between the two cannot be depended upon. For similar reasons, the author believes a demonstration of the statolith theory cannot come from the study of organs which are little or not at all reactive; hence we must regard his contribution as consisting of merely circumstantial evidence. The general trend of the paper is that in the various types of roots slightly or not at all geotropic, geotropism and starch migration are coincident and associated phenomena. He finds that in adventitious roots which are constantly ageotropic these starch grains are either not present in the cap or if present are irregularly distributed. In temporarily ageotropic roots the starch grains are either absent or if present are irregularly distributed during the ageotropic period. With incipient geotropism, however, the starch grains appear if previously absent, and commence to collect and function as statoliths. When geotropic response is prevented by the application of stronger stimuli, the starch grains which would otherwise change position to function as statoliths do not do so. Some of the orchids having aerial roots slightly geotropic do not have starch grains, and the author calls in chloroplasts of the root-cap to act as statoliths.—RAYMOND H. POND.

PALEOBOTANICAL NOTES.—STENZEL[19] has just published a very elaborate and valuable monograph describing all the known forms of fossil palm-wood.—NATHORST[20] briefly summarizes our knowledge of Antarctic fossil floras. A rather rich deposit of Jurassic age on Louis-Philippe Land yields numerous remains of Cladophlebis, besides representatives of Brachyphyllum, Elatides, Palissya, Taxites, Araucarites, Otozamites, Pterophyllum, Equisetum, Sagenopteris, Thinnfeldia, Scleropteris, and Stachypteris; all characteristic Jurassic forms, emphasizing the uniform cosmopolitan character of the Jurassic flora even in lat. 63° 30′ S. Seymour Island in lat. 64° S. yields fragments of a dicotyledon, of Araucarites, and of a conifer resembling Sequoia. The Malouine Islands furnish

[18] TISCHLER, G., Ueber das Vorkommen von statolithen bei wenig oder gar nicht geotropischen Wurzeln. Flora **94**:1–68. *figs. 31.* 1905.

[19] STENZEL, K. G., Fossile Palmenhölzer. Beitr. Palaeont. u. Geol. Oesterr. Ungarn. fol. pp. 182. *pls. 22.* 1904.

[20] NATHORST, A. G., Compt. Rend. **138**:1447–1450. 1904.

fragments of an Asterocalamites indicative of Upper Devonian or Lower Carboniferous age.—MAURY[21] reports *Hicoria minor*, *Castanea vulgaris*, *Fagus pliocenica*, *Ilex aquifolium*, and *Bambusa lugdunensis* from a new Pliocene locality at Capelle in the Department of Cantal, south central France.—HARTZ[22] records characteristic spikes of the common *Dulichium arundinaceum* (L.) Britt. of eastern North America, along with the remains of Picea, Brasenia, Hydrocharis, Carpinus, and Betula, from the interglacial of Brörup in southern Jutland, Denmark.—EDWARD W. BERRY.

HUME[23] calls attention to the anthracnose of the pomelo in Florida caused by *Colletotrichum gloeosporoides*. He reported in 1900 an injury to pomelo leaves caused by this fungus, a disease that was then referred to as leaf spot. HUME first noticed the same fungus on pomelo fruits in 1901 and now reports it upon twigs of the same plant. It is also known to cause a disease of lemon and lime fruits and is frequently seen on the leaves and twigs of the sweet orange and rarely on its fruit. Trees whose vitality has been reduced by improper soil conditions or by mechanical injury or through injuries inflicted by winds, frost, insects, or other diseases are more subject to this anthracnose than trees in perfect condition. It is recommended that all diseased fruits and branches be removed and burned and the trees sprayed with the usual Bordeaux mixture early in the season from May to July. Spray treatment should particularly be applied to trees whose branches show any evidence of the anthracnose. It is also recommended that the fruit be washed, before packing, with water to which has been added some ammoniacal copper carbonate solution or potassium sulfid. The later treatment will prevent the serious injury to the fruit that frequently occurs on the way to market.—E. MEAD WILCOX.

BY MEASURING the distance between oppositely located branches of small trees and shrubs, GANONG[24] has established that with autumnal defoliation the branches commence an inward movement toward the main axis. This inward movement continues after defoliation, reaching a limit with the full winter condition in January. With the swelling of the buds in April a reverse movement commences which continues through vernal foliation to the full summer condition in June. The movement accompanying defoliation and foliation is attributed merely to decreasing and increasing weight of branches, by loss and gain of leaves, but the intervening movement is regarded as indirectly thermometric because from experimental data (quite limited and so regarded by the author) it seems that the movement is correlated with variations in the amount of water in the stem and

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[21] MAURY, P., Le Monde des Plantes, Nov. 1903, pp. 54–55.

[22] HARTZ, N., Meddel. Dansk. Geol. Foren. **10**:13–22. *figs. 5.* 1904.

[23] HUME, H. HAROLD, Anthracnose of the pomelo. Bull. Florida Exp. Stat. 74:157–172. *pl. 1–4.* 1904.

[24] GANONG, W. F., An undescribed thermometric movement of the branches in shrubs and trees. Ann. Botany **18**:631–644. *figs. 6.* 1904.

that fluctuations in temperature induce such variations in water content. The author regards the movement as without ecological significance. The practical absence of other literature on this subject gives the paper a quality of uniqueness, and although negative results appear to equal the positive in number, the high ideals of the accurate and unprejudiced worker are everywhere suggested.—RAYMOND H. POND.

GANONG has published in an earlier paper his[25] views concerning some of the underlying principles of ecology, and to these he has added others[26] dealing especially with adaptation. After criticising the idea that ecology is synonymous with ecological geography, and deploring the lack of any significant advance in ecological methods in recent years, he plunges into a discussion of the philosophy of adaptation. Five principles are laid down; the first, as to the reality of adaptation, and the last, as to the inevitable imperfection of all adaptation, must meet with general acceptance. The second principle, dealing with the evolutionary phylogeny of adaptation, is taken up from a Lamarckian standpoint. GANONG thinks that the concomitance of diverse adaptations in a single species is to be accounted for best along Lamarckian lines. While this is doubtless true, there are as many objections to the Lamarckian as to other theories; indeed, some authors (DETTO[27] for example) regard the Lamarckian theory as the most untenable of all. The third and fourth principles are concerned with adaptation as a race process rather than an individual process, and with the metamorphic nature of its origin.—H. C. COWLES.

TANSLEY'S[28] address before the British Association on *The problems of ecology* is very suggestive, and indicates the rapid progress which is being made along ecological lines in the British Isles. TANSLEY proposes to narrow the definition of ecology to include only its geographic aspects. For instance, he would include the geographic distribution of pollination mechanisms, but would exclude the study of pollination mechanisms themselves. The reviewer can well imagine what a shock this will give to those who imagine that ecology includes nothing but the study of seed dispersal and pollination! TANSLEY uses as a synonym of ecology topographical physiology, which is practically identical with what the reviewer has termed physiographic ecology. It does not seem likely that TANSLEY's view as to the limits of ecology will meet general approval, since the broader term has been so universally regarded as highly desirable and much needed. The distinctions between descriptive and experimental ecology are well brought out, and proper emphasis is laid upon the ultimate aim of ecology, the discovery of causes.—H. C. COWLES.

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[25] See BOT. GAZ. **36**:447–453. 1903.

[26] GANONG, W. F., The cardinal principles of ecology. Science **19**:493–498. 1904.

[27] See BOT. GAZ. **38**:385–386. 1904.

[28] TANSLEY, A. G., The problems of ecology. New Phytologist **3**:191–200. 1904.

PARTHENOGENESIS in Taraxacum and Hieracium is being investigated by MURBECK.[29] Two species of Taraxacum were studied, *T. vulgare* (Lam.) Raunk., which produces abundant, but imperfect pollen, and *T. speciosum* Raunk., which produces no pollen at all. The embryo-sacs present nothing unusual in their appearance. The egg cell increases in size, its nucleus divides, and the embryo is formed just as if normal fertilization had occurred. The polar nuclei fuse and then divide, giving rise to the endosperm.

Three species of Hieracium were examined, *H. grandidens* Dahlst., *H. serratifrons* Almqu., and *H. colophyllum leiopogon* Gren. In general, the embryo-sac resembles that of Taraxacum. The embryo is developed from the egg, and embryos are formed in eighty per cent. or ninety per cent. of the flowers, so that it is probable that these species are always parthenogenetic. A full account with illustrations is to follow.—C. J. CHAMBERLAIN.

MISS COOLEY[30] has given an account of the ecology of the tamarack, which has been based upon a considerable amount of field study in various states. Attention is called to the unusally wide range of the tree, which occurs in five of MERRIAM'S zones. The tree displays great vigor even at the extreme northern and southern limits. The range of topographic habitat is also wide; although commonly thought of as a swamp tree, it occurs in almost every habitat, even to the most xerophytic. Among the characteristics which may serve to give this tree its great success, Miss COOLEY mentions the abundance of seeds, the frequency with which the tree produces seeds, the power of the seedlings to endure light, indifference to soil, and rapid growth. A great disadvantage is the inability of the tree to endure shade, or to compete with other forest trees. In a Maine area a tamarack swamp has succeeded a hardwood forest.—H. C. COWLES.

APOGAMY in Hieracium is described by OSTENFELD,[31] who in 1903 in a paper written conjointly with RAUNKIAER reported that twenty-two species of the genus had been found to produce seeds even after pollination had been prevented. OSTENFELD now finds that many of the seeds thus produced germinate normally. In the botanical garden at Copenhagen two species of Hieracium were found which produce only female flowers, a careful examination showing not a single pollen grain. These plants were isolated under control in the greenhouse and produced abundant seeds. Whether the embryos arise from unfertilized eggs was not determined. Attempts to germinate the pollen of pollen-bearing species failed. This would indicate that the great number of forms in the genus, usually attributed to hybridization, are due rather to mutation. All attempts to produce hybrids were unsuccessful.—C. J. CHAMBERLAIN.

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[29] MURBECK, Sv., Parthenogenese bei den Gattungen Taraxacum und Hieracium. Bot. Notiser **1904**:285–296.

[30] COOLEY, GRACE E., Silvicultural features of *Larix americana*. Forestry Quarterly **2**:148–160. 1904.

[31] OSTENFELD, C. H., Zur Kenntniss der Apogamie in der Gattung Hieracium. Ber. Deutsch. Bot. Gesells. **22**:376–381. 1904.

THE NUTRITION of the chromatin thread and the chromosomes by nucleolar material is well shown, according to VON DERSHAU,[32] in the active nuclei of the parietal endosperm of *Fritillaria imperialis*. The increasing staining capacity of the chromatin thread is correlated with the dissolution of the nucleoli; besides, slender connections unite the nucleoli and the thread and indicate a streaming of material. Resting nucleoli are spherical or ellipsoidal, while those in the active condition are more or less irregular or star-shaped. A study of karyokinesis showed a direct relation between the nucleoli and spindle formation. An investigation of the development of the peristome of *Funaria hygrometrica* and *Bryum argenteum* showed that the nucleoli play an active part in the local thickenings of the cell wall. VON DERSHAU draws the conclusion that the nucleoli consist of reserve substance.—C. J. CHAMBERLAIN.

BISPORANGIATE STROBILI have not hitherto been observed in Juniperus, and only a single case has been reported for the Cupressineae. An interesting case is described by RENNER[33], who discovered a plant which bears such strobili almost exclusively. Only on a few twigs, and here only toward the tips, was there a transition to purely ovulate strobili. In the base of the bisporangiate strobilus there are a few sterile leaves, above these are two or three whorls of staminate sporophylls, and at the tip are the ovules. There may be a whorl of sterile leaves between the staminate sporophylls and the ovules. The pollen develops normally, but so much later than the ovules that there is no possibility of self-pollination. RENNER sees in these bisporangiate strobili a suggestion of the method by which the bisporangiate flowers of angiosperms may have arisen.—C. J. CHAMBERLAIN.

WHITE[34] has published the first American contribution to our knowledge of those paleozoic fern-like plants which had acquired the seed-habit, a subject under active investigation abroad of late. He records abundant gymnospermous fruits in the fern-genus Aneimites from the lower Pottsville of West Virginia. They are usually borne singly at the apices of the slightly dilated terminal extensions of the outer pinnae, and show some slight indications of a pollen-chamber. They have been found only as impressions and therefore cannot be compared properly with the beautifully preserved foreign specimens showing internal structure. The author is of the opinion that the American form is more closely related to Lagenostoma than to any other cycadofilicinean type at present recognized as seed-bearing.—EDWARD W. BERRY.

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[32] DERSHAU, MAX VON, Wanderung nukleolarer Substanz während der Karyokinese und in lokal sich verdickenden Zellen. Ber. Deutsch. Bot. Gesells. **22**:400–411. *pl. 21.* 1904.

[33] RENNER., OTTO, Ueber Zwitterblüthen bei Juniperus communis. Flora **93**:297–300. *fig. 3.* 1904.

[34] WHITE, D., Smithsonian Miscellaneous Collections **47**:322–331. *pls. 47–48.* 1904.

PARTHENOGENESIS in *Wikstroemia indica*, one of the Thymelaeaceae, is announced in a preliminary paper by WINKLER.[35] The pollen develops imperfectly or not at all, and attempts to germinate the pollen by the usual methods were unsuccessful. Although pollination was prevented, embryos developed, and sections showed that the embryos arise from unfertilized eggs. The behavior of the chromatin will be studied later. Up to date the angiosperms in which parthenogenesis has been shown to exist are *Antennaria alpina*, *Alchemilla* (several species), *Thalictrum purpurascens*, *Taraxacum officinale*, *Hieracium*, and *Wikstroemia indica*. *Gnetum Ula* is the only gymnosperm in which parthenogenesis has yet been reported.—CHARLES J. CHAMBERLAIN.

OLSSON-SEFFER[36] has written a short defense of LINNAEUS, à propos of the recent Swedish biography by T. M. FRIES. The particular occasion for OLSSON-SEFFER'S paper is a choleric and most unjust attack upon LINNAEUS by KALISCHER and HANSEN. Considerable attention is also paid to the unfair treatment which is accorded to LINNAEUS in SACHS'S *History of Botany*. There can be no doubt that LINNAEUS has a secure place among the greatest botanists of all time, and the imputations that have been cast upon him are certain to be less harmful to the renown of LINNAEUS than to the reputation of his accusers.—H. C. COWLES.

INTERCELLULAR PROTOPLASM has been further investigated by KNY.[37] The principal material was cotyledons of *Lupinus albus* and *L. angustifolius*. That the protoplasm in the intercellular spaces is in direct communication with that of the neighboring cells is probable from the fact that the spaces contain starch grains. If there is protoplasmic continuity between the intercellular spaces and the neighboring cells the absence of nuclei in the spaces would not be strange. Perforations and connecting threads could not be identified positively. How the protoplasm gets into the spaces the author is not yet ready to explain.—C. J. CHAMBERLAIN.

THE PHYTON THEORY is supported by COL in a lengthy paper[38] which deals mainly with abnormally placed vascular bundles in dicotyledons. Starting with the Campanulaceae the author has extended his observations to a large number of families, and reaches the conclusion that the bundles in question are normal in part of their course, though frequently for only a short distance. The chief arguments advanced in favor of the phyton theory are (1) the bundles coming from the leaves diminish in volume as they descend through the stem; (2) practically

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[35] WINKLER, HANS, Ueber Parthenogenesis bei *Wikstroemia indica* (L.) C. A. Mey. Ber. Deutsch. Bot. Gesells. **22**:573–580. 1905.

[36] OLSSON-SEFFER, P., The place of Linnaeus in the history of botany. Jour. of Bot. **42**:262–269. 1904.

[37] KNY, L., Studien über intercellulares protoplasma II. Ber. Deutsch. Bot. Gesells. **22**:347–355. 1904.

[38] COL, A., Recherches sur la disposition des faisceaux dans la tige et les feuilles de quelques dicotylédones. Ann. Sci. Nat. Bot. **8**: 20: 1–288. 1904.

all of the vascular formations of the stem supply appendicular organs.—M. A. CHRYSLER.

HOLLICK[39] has published further additions to the Cretaceous flora of Long Island, treating of plants from the Northport Clays and from the vicinity of Hempstead Harbor, Oyster Bay, and Montauk Point. Nine new species, including an interesting form of Marsilia, are described. The supposed palm Serenopsis is reconsidered in the light of better material and is definitely referred to Nelumbo. This leaves a species of palm (about to be published by the undersigned in *Torreya*) coming from the mid-Cretaceous of Delaware and Maryland, as the earliest known plant of this type from American strata.—EDWARD W. BERRY.

NEWCOMBE,[40] in his presidential address before the Michigan Academy of Science, contrasts the old and new types of biological surveys, and makes a strong appeal for the new progressive and definite survey of the ecological type, accompanied by detailed maps, such as has been carried on by FLAHAULT in France, by the SMITHS in Britain, and begun in Michigan by LIVINGSTON. Concise statements are made concerning the uses of such a survey, both scientific and practical. It is much to be hoped that the plan here advocated will be carried out, not only in Michigan but in many other states as well.—H. C. COWLES.

LAWRENCE gives the results of his investigation of the apple scab in Washington.[41] He was able, as were CLINTON and others, to confirm the discovery made by ADERHOLD, that *Fusicladium dendriticum*, found as a parasite on the fruit and leaves of the apple during the summer, is but a stage in the development of *Venturia inaequalis*, the perfect form being found on the dead leaves as a saprophyte during the winter. He recommends that the fallen leaves should be gathered and destroyed and that the usual spraying with Bordeaux mixture be conducted in the spring.—E. MEAD WILCOX.

CHEMOTAXIS of the sperms of Marchantia toward a number of albumins, globulins, nucleo-albumins, proteids, and enzymes, is the subject of a paper by by LIDFORSS.[42] Out of nineteen substances tested only two gave a negative result; all the others attract the sperms when in the right concentration. The author suggests that proteid substances are probably the main factor in the attraction of such sperms to the archegonia in nature, as well as in the tropism of pollen tubes. There is some evidence that Marchantia sperms are positively aerotropic. —B. E. LIVINGSTON.

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[39] HOLLICK, A., Additions to the paleobotany of the cretaceous formation on Long Island. II. Bull. N. Y. Bot. Gard. **3**:403–418. *pls. 70–79.* 1904.

[40] NEWCOMBE, F. C., A natural history survey for Michigan. Annual Report Mich. Acad. Sci. **6**:28–36. 1904.

[41] LAWRENCE, W. H., The apple scab in western Washington. Bull. Wash. Exp. Stat. **64**:1–24. *figs. 1–5. pl. 1–2.* 1904.

[42] LIDFORSS, B., Ueber die Reizbewegungen der Marchantia-Spermatozoiden. Jahr. Wiss. Bot. **41**:65–87. 1904.

HUME[43] has published an account of observations and experiments regarding five serious diseases of the Irish potato that are known to occur in Florida: late blight, caused by *Phytophthora infestans;* early blight, caused by *Alternaria solani;* scab, caused by *Oospora scabies;* rhizoctonia blight, caused by a species of *Rhizoctonia;* and bacterial blight, caused by *Bacillus solanacearum.* A brief discussion of the nature and effects of each disease is accompanied by statements as to the proper methods of control to be employed in each case.—E. MEAD WILCOX.

FROM A consideration of the various causes assigned by different authors as inducing flower-formation, LOEW[44] believes that such causes have one common physiological factor, namely, an increased concentration of sugar. He advances the theory that flower-formation is a phenomenon of irritability; that a certain concentration of sugar in the plant stimulates the embryonic substance to differentiate male and female nuclei. Unfortunately, the evidence offered is very limited and not at all conclusive.—RAYMOND H. POND.

NATHANSOHN'S last work on permeability of the plasmatic membranes of plants,[45] which was reviewed in these pages some time since,[46] includes in its discussion the results of a large series of experiments with the tissue of Dahlia tubers. The paper which embodied the details of this work, though actually published before the one already reviewed, has but recently come to hand.[47] Those interested in this subject will need to read the two papers together.—B. E. LIVINGSTON.

THE FIRST NUMBER of the second series of KARSTEN and SCHENCK'S[48] *Vegetationsbilder* comes from the hand of ULE, the well-known student of the South American tropics. The number is devoted to the illustration of some characteristic epiphytes of the Amazon district, and the standard of the preceding numbers is fully maintained. Among the epiphytes figured are Nidularium, Platycerium, Polypodium, Cereus, and Anthurium.—H. C. COWLES.

THE INFLUENCE of weak aqueous solutions of ether upon the growth of Spirogyra has been studied by GERASSIMOW.[49] In these cultures many of the

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[43] HUME, H. HAROLD, Potato Diseases. Bull. Florida Exp. Stat. **75**:177–196. *pl. 1–4* and frontispiece. 1904.

[44] LOEW, OSKAR, Zur Theorie der blütenbildenden Stoffe. Flora **94**:124–128. 1905.

[45] NATHANSOHN, A., Weitere Mitteilungen über die Regulation der Stoffaufnahme. Jahrb. Wiss. Bot. **40**:403–442. 1902.

[46] BOT. GAZETTE **38**:477. 1904.

[47] NATHANSOHN, A., Ueber die Regulation der Aufnahme anorganischer Salze durch die Knollen von Dahlia. Jahrb. Wiss. Bot. **39**:607–644. 1904.

[48] KARSTEN, G., und SCHENCK, H., Vegetationsbilder. Zweite Reihe, Heft 1. E. ULE, Die Epiphyten des Amazonasgebietes. *Tafel 1–6.* Jena: Gustav Fischer. 1904. Single parts *M* 4; to subscribers *M* 2.50.

[49] GERASSIMOW, J. J., Aetherkulturen von Spirogyra. Flora **94**:79–88. 1905.

cells swell laterally and thus become barrel-shaped. Certain cells without nuclei increase in length but never swell in this way. Thus the author concludes that the swelling is brought about in some manner through the action of the ether upon the nuclear mechanism.—B. E. LIVINGSTON.

TSCHIRCH[50] finds that many dicotyledonous plants possess two types of root in the same individual, one sort having a nutritive function and the other serving to fasten the plant to the substratum. The so-called "fastening roots" are distinguished by the presence of mechanical fibers and generally by the absence of pith and by the larger size of the central cylinder.—M. A. CHRYSLER.

R. M. HARPER[51] has continued his valuable ecological and taxonomic observations on the flora of Georgia, a state whose botany has been peculiarly unknown until these and previously noted[52] studies were made. In addition to critical taxonomic notes, these papers contain accounts of the author's itinerary, together with landscape figures and ecological remarks.—H. C. COWLES.

EPIPHEGUS VIRGINIANA has been studied by COOKE and SCHIVELY,[53] who find that the parasitic haustoria arise from the roots of the host, the beech, and not from the parasite. As is usual in such plants, there is a precocious endosperm, and the embryo is rudimentary. Bicollateral bundles are found both in the tuber and in the aerial shoot.—M. A. CHRYSLER.

WOODRUFFE-PEACOCK[54] has published some rather peculiar suggestions on the study of rock-soil floras. An immense number of habitat types are proposed, but no attempt is made at analysis. It is obvious that the author is not conversant with modern ecological literature.—H. C. COWLES.

THE STRUCTURE and sprouting of the seed, and the structure of the mature plant of *Cassytha filiformis* are described by Miss BOEWIG.[55] This plant, though a parasite resembling Cuscuta, has functional chlorophyll tissue, especially when growing in the shade.—M. A. CHRYSLER.

TANSLEY[56] gives an account of the methods which he has employed in ecological surveying with his classes on the coast of Brittany. The scheme makes possible accurate and detailed mapping.—H. C. COWLES.

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[50] TSCHIRCH, A., Ueber die Heterorhizie bei Dikotylen. Flora **94**:68–78. 1905.

[51] HARPER, R. M., Botanical explorations in Georgia during the summer of 1901. Bull. Torr. Bot. Club **30**:282–295, 319–342. 1903. Explorations in the coastal plain of Georgia during the season of 1902. Bull. Torr. Bot. Club **31**:9–27. 1904.

[52] See BOT. GAZ. **34**:386. 1902.

[53] COOKE, E., and SCHIVELY, A. F., Observations on the structure and development of *Epiphegus virginiana*. Contrib. Bot. Lab. Univ. Penn. **2**:352–398. 1904.

[54] WOODRUFFE–PEACOCK, E. A., How to make notes for a rock-soil flora. Rural Studies Series, No. 5. Louth, 1904.

[55] BOEWIG, HARRIET, The histology and development of *Cassytha filiformis*. Contrib. Bot. Lab. Univ. Penn. **2**:399–416. 1904.

[56] TANSLEY. A. G., A second experiment in ecological surveying. New Phytologist **3**:200–204. 1904.